
CHAPTER TWO

RESULTS

This chapter is divided into three parts. Part one contains an overall analysis of responses received from the federal agencies and the industry/university community with respect to Tier 3/4 training. Part two is a reassessment of the Tier 2 training initiatives in light of the new and more detailed training information received from this review. Part three is an assessment of training areas of particular importance to the aviation weather community. An overall summary of results and summaries by agency are in Appendix B and C.

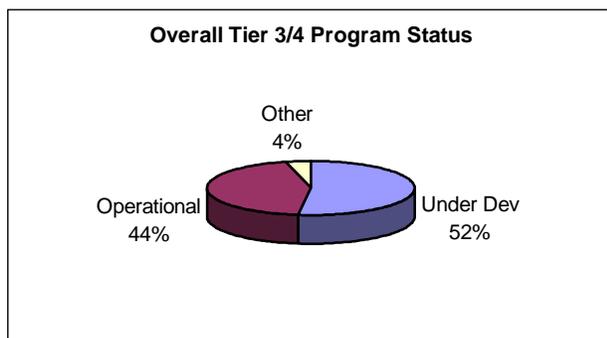
Part 1 – Overall Results

Program Type

For purposes of this study, Tier 3/4 programs are categorized as new or recently fielded systems, products, or training. Federal agencies and the industry/university community submitted eighty-nine Tier 3/4 programs² contained in the OFCM, April 16, 2001, National Aviation Weather Initiatives Final Baseline Tier 3/4 Report. Of the eighty-nine programs, fifty-eight (sixty-five percent) are aviation weather related systems and/or technology, twenty-nine (thirty-four percent) are products or product related, and two (two percent) deal with training.



Program Status

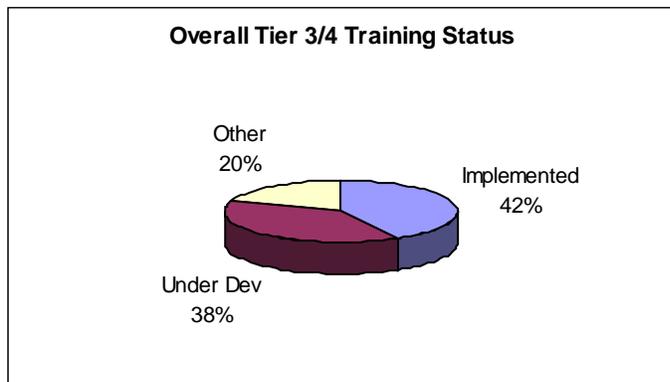


Based on the April 2001 Tier 3/4 Baseline Report, fifty-two percent of the programs are under development, forty-four percent are operational, and the remaining four percent are considered as “other” meaning the program is either terminated or else is completed but awaiting transition to operations.

² The word program is used in a general sense throughout the report to refer to programs, projects, and work elements within projects.

Training Status

Respondents were asked to indicate which of the milestones contained in Part II.A. of the training template (Appendix A) had been met or were currently being worked. The objective is

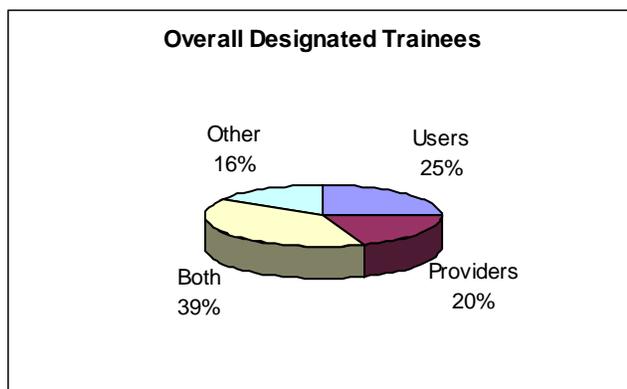


to determine how far along the implementation of training has progressed for each program. Training that is determining requirements, acquiring training resources, or developing curriculum is considered under development. Training that is undergoing initial validation and evaluation, already implemented, or undergoing periodic update and review of course content and curriculum is considered implemented. Of the eighty-

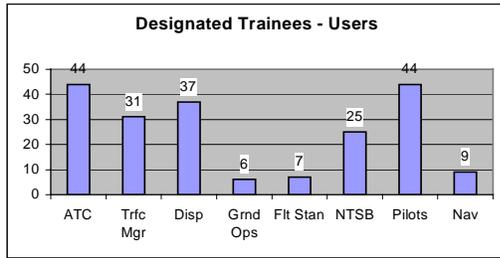
nine Tier 3/4 programs, thirty-seven (forty-two percent) have implemented training to some degree, thirty-four (thirty-eight percent) have training under development, and eighteen (twenty percent) are classified as “other”. Training reported as “other” is either associated with programs early in the research and development cycle (training milestones not yet established) or with programs that do not require training for users and providers. *This summary indicates that the majority of Tier 3/4 programs are ensuring that training is an integral part of the program development process and that program managers are following through with the training process as part of the overall implementation strategy.*

Designated Trainees

Program managers were asked to identify which operational aviation weather users and providers were designated to be trained as part of their training strategy within their respective programs. The template listed potential user/provider training candidates by functional area, job title, and skill level. The list was developed and coordinated with the agencies and the private sector. Twenty-two programs (twenty-five percent) designate training for users only; eighteen (twenty percent) designate providers only; and thirty-six (thirty-nine percent) designate both. The remaining fourteen programs (sixteen percent) have not determined potential trainees as yet or, in some cases, the programs are not for operational aviation weather users or providers and therefore training is reported as not applicable. *This summary indicates that generally all sectors of the aviation weather community are being considered for training to some extent. However, as reflected in the following section, some functional areas may require additional emphasis.*



Designated Trainees – Users and Providers



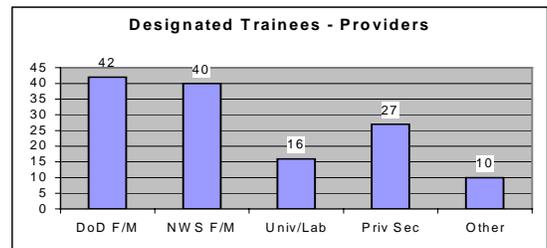
This section looks at the overall Tier 3/4 training for various functional areas within the user and provider groups. *The summary shows*

Designated Trainees- Users	
ATC	– Air Traffic Controllers
TrfcMgr	– Traffic Managers
Disp	– Dispatchers
Grnd Ops	– Ground Operations
Flt Stan	– Flight Standards
NTSB	– National Transportation Safety Board
Pilots	– Pilots
Nav	– Navigators

that for some functional areas within the aviation weather community, training is being provided. Assuming that training improves job performance and efficiency, it should be an integral part of the process of effectively transitioning new technologies to operations. These overall percentages indicate that for some user functional areas such as Ground Operations (six percent), Flight Standards (seven percent), and Navigators (nine percent) and for some provider functional areas such as universities and

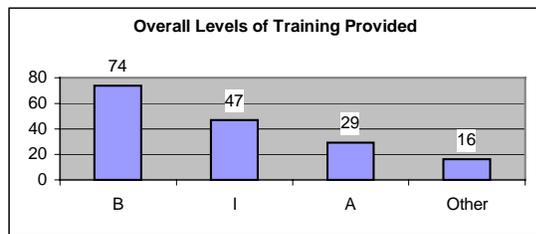
Designated Trainees- Providers	
DoD F/M	– DoD Forecasters/Meteorologists
NWS F/M	– National Weather Service Forecasters/Meteorologists
Univ/Lab	– Universities/Laboratories
Priv Sec	– Private Sector

as universities and laboratories (sixteen percent), more attention to specialized training may be needed. To help ensure all areas receive training, any new or existing Tier 3/4 training should be made available to all operational aviation weather users and providers. These data are further broken down by job title and skill level within each functional area and the results appear in Appendices B and C.



Training Levels

To determine the levels of training being provided, program managers were asked to characterize training as basic, intermediate, or advanced. For purposes of this report, **Basic** training is defined as training normally provided at the job entry level for initial knowledge and task performance skills needed by new trainees with little or no background knowledge in the subject area. **Intermediate** training is defined as knowledge and



task performance training that would normally be provided to an already proficient trainee, with related work experience and a

Training Levels	
B	– Basic
I	– Intermediate
A	– Advanced

background of knowledge in the subject area, to increase knowledge and task performance skills. **Advanced** training is defined as knowledge and task performance training provided to supervisors, managers, or technicians who are subject matter experts in the functional area or field of study. Of the eighty-nine programs, sixty-six (seventy-four percent) provide training at the basic level; forty-two (forty-seven percent) at the intermediate level; and twenty-six (twenty-nine percent) at the advanced level. Fourteen (sixteen percent) are characterized as “other” because the programs are early in the research and

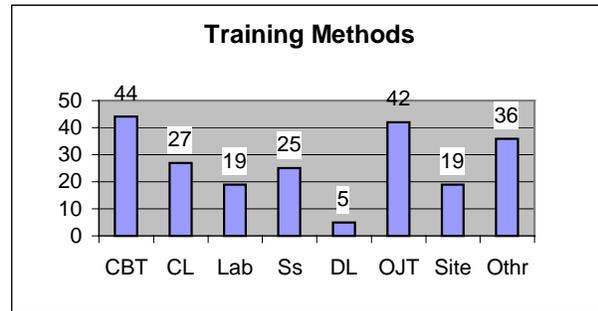
development cycle or training is not applicable to users and providers. *This summary indicates that training is being developed and implemented to meet the specific needs of all levels of trainees.*

Training Methods

This section summarizes the methods being used for training. Although training quality and efficiency are the highest priority, training costs are a significant factor. Costs are not only determined in terms of the resources needed

Training Methods
CBT – Computer Based Training
CL – Classroom
Lab – Laboratory
Ss – Self study
DL – Distance Learning
OJT – On-the-job Training
Site – On-site
Othr – Other (to be determined or not applicable)

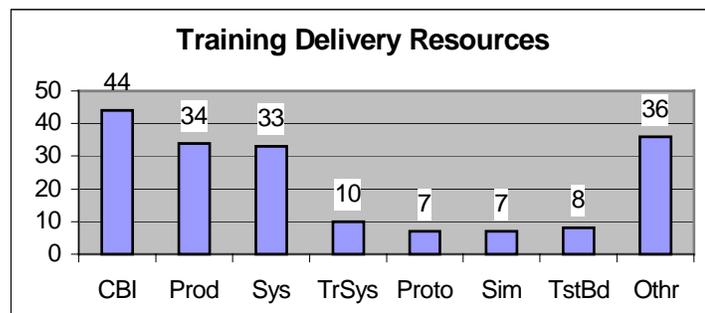
for training development and delivery, but costs in man-hours used for attending training are also of



particular importance. Training often requires the trainee to be away from operational duties in order to accomplish training outside the work area. Several programs use a variety of methods for conducting training. Although on-the-job training (forty-two percent), computer based training (forty-four percent), self-study (twenty-five percent), and classroom/laboratory (twenty-seven/nineteen percent respectively) are cited most often, there appears to be significant use of on-site training as well (nineteen percent). The “other” category indicates that approximately one third of the programs have yet to determine the training methods or else a training component is not required. *This summary shows that a wide variety of training methods are being used. In many cases, more than one method is used in combination. Although not directly reflected here, several program managers mentioned using training links on a product’s web page. Particularly with new products, a training link for that product is a very effective and convenient way to train new users. This practice minimizes costs in terms of training resources and staff-hours.*

Training Delivery Resources

Training delivery resources such as hardware, software, operational equipment, and other training tools used to deliver training are divided into seven categories excluding “other” (see text box next page). The percentages for computer based instruction (forty-four percent), operational



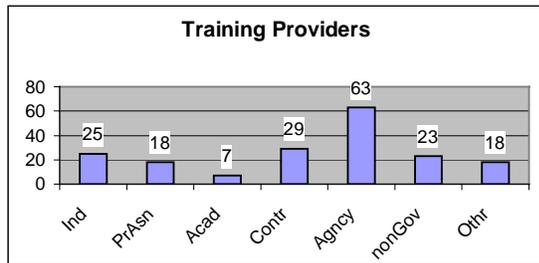
products (thirty-four percent), and operational systems (thirty-three percent) are comparable suggesting that they are often used together. Training systems, prototypes, simulators, and test beds are used sparingly (seven to ten percent). The same comment applies here for the “other” category as it does under training methods.

Training Delivery Resources

CBI – Computer Based Instruction
 Prod – Operational Product
 Sys – Operational System
 TrSys – Training System
 Proto – Prototype Product or System
 Sim – Simulated Product or System
 TstBd – Test-bed Product or System
 Othr – Other (to be determined or not applicable)

Training Providers

Federal agencies are the predominant providers of training for Tier 3/4 programs (sixty-three percent). In many cases, however, training efforts led by federal agencies are provided with the support of contractors (twenty-nine percent). Similarly, training provided by other organizations include industry (twenty-five percent), professional associations (eighteen percent) such as the Aircraft Owners and Pilots Association, the National Weather Association, and the American



Meteorological Society, academic institutions (seven percent), and non-government

Training Providers

Ind – Industry
 PrAsn – Professional Association
 Acad – Academic Institution
 Contr – Contractor
 Agency – Federal Agency
 nonGov – Non-Government
 Othr - Other (to be determined or not applicable)

entities (twenty-three percent) such as the National Center for Atmospheric Research.

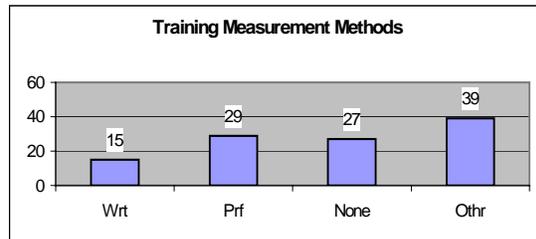
Training Measurement Methods

Training measurement, in the form of testing, is a way to determine if the subject matter has been learned by a trainee in order to meet training objectives. Measurement can be written

Training Measurement Methods

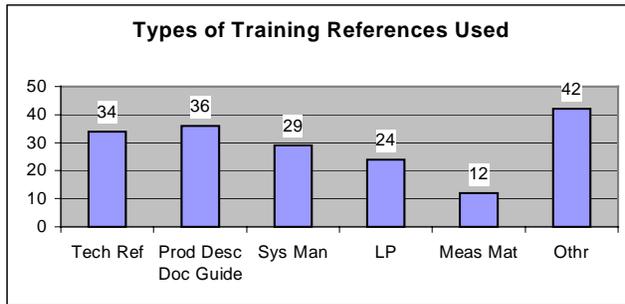
Wrt – Written Measurement
 Prf – Performance Measurement
 Othr- Other (to be determined or not applicable)

or performance-based (tasks performed by the trainee and evaluated by the trainer or subject matter expert).



Training objectives should match the training level (basic, intermediate, or advanced) and the measurement level should likewise match the training objective. Although not often recognized, the process of measurement and critique is one of the most effective methods of learning and retention. Thorough review and critique of a completed measurement increases learning retention and assimilation by re-enforcing material correctly learned and clarifying material incorrectly learned. *With this in mind, it is notable that there is a relatively high percentage of training that is not measured (twenty-seven percent). It is incumbent upon training managers to ensure training measurements are an integral part of all training programs.* Again, the relatively high “other” percentage reflects those programs where measurement methods have yet to be determined or else they don’t apply.

Training References



Training References

- Tech Ref - Technical References
- Prod Desc - Product Description
- Doc Guide - Documentation Guide
- Sys Man - System Manuals
- LP - Lesson Plans
- Meas Mat - Measurement Materials
- Othr - Other (To be determined or not applicable)

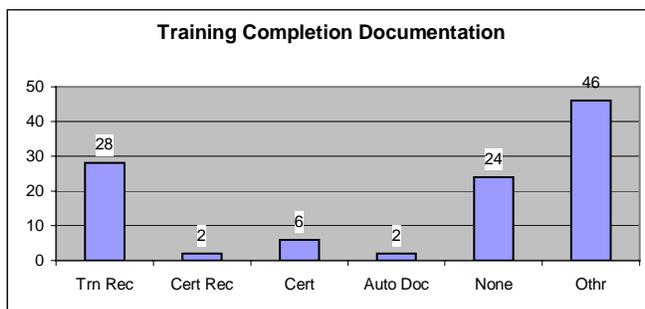
This section provides an indication of the types and percentages of reference material used for curriculum development and training delivery. The use of these course control documents indicates that program managers are maintaining training development and delivery processes in order to ensure high levels of validity, currency, accuracy, relevance, and consistency. *This summary shows that a wide variety of training references are being used. The use of training references indicates an effort on the part of training managers to ensure training validity and currency. The summary also shows that a relatively high percentage of programs in the “other” category have either not determined training references as yet or else training does not apply.*

Training Completion Documentation

A deliberate, monitored process of documenting the completion of training can be an effective method of ensuring that all training designees actually receive training and complete it successfully. Training documentation procedures ensure that all users and providers of aviation weather information are receiving training to

Training Completion Documentation

- Trn Rec – Training Records
- Cert Rec – Certification Records
- Cert – Certificates
- Auto Doc – Automated Documentation Record
- Othr - Other (To be determined or not applicable)



maintain job currency and proficiency. Routine reviews of training documentation can be used as a method of evaluating work center proficiency and identifying individuals who have not yet received needed training. As new programs are fielded, all appropriate aviation weather users and providers should be trained in the

new technology as soon as possible. Documenting this training and tracking compliance ensures full integration of the advances of new technologies into routine tasks and operations. *This summary shows that nearly a quarter (twenty-four percent) of the training has no documentation procedure. Of the remaining training, forty-six percent is classified as “other” meaning not applicable or to-be-determined, twenty-eight percent use individual training records, two*

percent use certification records, six percent use certificates, and two percent use automated documentation systems. It is strongly recommended that training managers adopt training documentation procedures for all aviation weather training.

Training Length

Based on the responses received, training lengths ranged from one to eighty hours. The average training length was six hours for users and eleven hours for providers. Forty-three percent of the programs reported training lengths as not yet determined or not applicable. In general, it appears that training developers are ensuring training lengths meet specific training objectives. Training focused on clear and measurable objectives prevents training redundancy and minimizes the cost of training resources and staff-hours.

Group Size

Based on the responses received, group size ranged from one to an extreme of 150 students. The average minimum group size is three, the average desired size is nine, and the average maximum size is sixteen. Forty-seven percent of the programs report group size as yet to be determined or not applicable. As with trainer-to-trainee ratios in the following section, except for the extremes, training group size, in general, appears to be at a level consistent with the principles of sound learning, an effective learning environment, and cost efficiencies.

Trainer-to-Trainee Ratio

It is assumed that smaller instructor to student ratios provide a favored learning environment. Small ratios allow for greater instructor-student interaction and instruction can be tailored to the individual needs and learning characteristics of diverse student populations with diverse operational backgrounds. The most common trainer-to-trainee ratio is one instructor to one to six trainees (thirty percent). This seems to indicate an effort on the part of training managers to keep the ratios relatively small. The remainder of ratios reported, other than self-study (SS), are one instructor to six to twelve students (eleven percent). There are no programs reporting training ratios of one instructor to more than twelve students. In cases where group size is greater than twelve, multiple instructors are used to assist in the instruction. Self-study often refers to training provided with web-based products. This training is most often in the form of help links containing explanations and other information specific to the product, such as how to interpret the product. A high percentage of programs (forty-six percent) in the other category indicate that trainer to trainee ratios have yet to be determined or are not applicable.

